

Signal Words and Phrases:

- A minus B _____
- the difference of A and B _____
- A subtract B _____
- Subtract A from B _____
- A, less B _____
- A less than B _____
- A is less than B _____

Modeling

Example: **There are twice as many red candies as blue candies**

- R: number of reds B: number of blues
- Final translation

Test Idea:

- | | |
|--|--------------|
| Translate into Arithmetic/Algebra | Solve |
| _____ | _____ |

Story Problem Steps:

- 1) **Read (!)**
- 2) **Ask how many answers are wanted.**
Describe these answers in English*, and after that choose a letter(s)

Translation tip: “each” or “solutions” suggest 2 or more answers, and they are not necessarily the same answer.

- “how far” suggests # of miles/feet/etc.
- “how long until” suggests # of hours/minutes/etc.
- * use your heart language (Spanish, Korean, ...) in the description

- 3) **Translate into Algebra.**

Translation tips: Drawing pictures can help.
Formulas may be needed
Translate what you can, then fill in later.
You might have part English, part Algebra as part of this
You are done when an equation pops out.

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4) Solve and Check

Drawing

Example: Mixture

Dale Johansen needed 80 liters of a 20% solution, but all he had was plenty of 50% solution and 15% solution. How many liters of each should he use ?

Reality Check:

Example: Pies

Vickie and Ahmed have found the profit in their pie store to be $P(x) = -x^2 + 25x + 150$, where x is the number of pies sold daily. How many pies to make a positive profit?

Testing Tip: Grading Rubric (at least for developmental classes)

Out of 4 points, 1 point: identify variables

2 points: the equation

1 point: the answer (with extraneous solutions deleted)

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Connie Buller, Metropolitan CC, Omaha, NE
CBuller@mccneb.edu

The audience will be invited to model as a classroom of students, participating in the stories and their solutions. Also, ideas from the audience as to what works well for them will be elicited and shared. In addition to modeling questioning techniques using the audience as a sample classroom, the techniques (visual, timing, psychological) will be summarized verbally.

Students usually list story problems as their worst fear. We teachers know it is one of the hardest things to teach, because it requires linking concrete reality with the abstract of mathematics. As I have taught story problems, and have continued to think about how to teach them, I have tried differing approaches.

I will not be doing problems with horrendous tables and charts of numbers. I will be doing the traditional mixture, distance, profit, work problems. I will be focusing on how to translate the situation or "story" into algebraic equations. Today I was helping a College Algebra student with a mixture problem. He said, "I remember my teacher in Intermediate Algebra showed me a table method that worked like anything, but I couldn't remember the method." So I put him into the story: your budget has run out, and new regulations require you to have 70 gallons of a 20% disinfectant solution, and all you have in store are barrels of 15% and 50% stuff. Can you do this? We drew barrels, labeled each, identified the need x : # of gallons of 15%; y : # of gallons of 50%, and then proceeded to get the equations. Later I asked him what helped. He said the pictures. "They sort of separated everything. I got so used to filling in the tables, with this here and that there, that I forgot what I was looking for."

Also, in my developmental classes, I am including a new blank when I give story problems on exams: "Translate into arithmetic". Textbooks do stress things like "sum" means +, but in practicality, students usually have to only try a finite number of operations, and then use the reasonable answer. By having them translate, it helps them focus on the required operation(s), and not jump right into the arithmetic involved.

I have observed far too many adjunct teachers ask a question in class, with the teacher immediately answering the question, without giving the students a chance to participate or discover anything for themselves. So I will be addressing questioning techniques as well as ways to make sure every person in the class involved in the discussion. If mathematics is an action sport, then we cannot expect passive spectators to do very well in the action.

Since most of us learn best by doing, I will pretend with my audience that they are my class. I will model these things, much as I did with the student above, but then break away from the pretending,

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Please write me – I would enjoy hearing from you!
Connie Buller cbuller@metropo.mccneb.edu

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and ask them what they have noticed that worked. I will also ask them to share ideas that seem to help them when they teach story problems.